WHAT IS CLAIMED IS:

1. A method of producing a reflection type mask blank by forming, on a substrate, at least a multilayer reflection film for reflecting exposure light and an absorber layer formed on said multilayer reflection film for absorbing the exposure light, wherein:

in order to avoid mixing at an interface between respective layers forming said multilayer reflection film due to thermal factors after deposition of said multilayer reflection film, said substrate with the multilayer reflection film is subjected to heat treatment during deposition and/or after deposition of said multilayer reflection film so as to suppress the progress of the mixing at the interface between the respective layers.

2. A method of producing a reflection type mask blank as claimed in claim 1, wherein the heat treatment is carried out before a resist film is formed on said absorber layer.

3. A method of producing a reflection type mask blank as claimed in claim 2, wherein said resist film is a chemically amplified resist.

4. A method of producing a reflection type mask blank as claimed in claim 1, wherein a substrate heating temperature in the heat treatment is not lower than 50°C and not higher than a baking temperature of said resist film.

5. A method of producing a reflection type mask blank as claimed in claim 1, wherein the heat treatment is carried out by keeping said multilayer reflection film formed on said substrate in contact with a liquid held in a heated state.

6. A method of producing a reflection type mask, comprising the step of forming a pattern on said absorber layer of the reflection type mask blank produced by the method of producing a reflection type mask blank claimed in claim 1.

7. A method of producing a semiconductor device, comprising the step of forming a fine pattern on a semiconductor substrate by lithography using said reflection type mask produced by the method of producing a reflection type mask claimed in claim 6.

8. A method of producing a reflection type mask blank by forming, on a substrate, at least a multilayer reflection film for reflecting exposure light and an absorber layer formed on said multilayer reflection film for absorbing the exposure light, comprising:

the step of carrying out, before a resist film is formed on said absorber layer, heat treatment of said multilayer reflection film formed on said substrate at a substrate heating temperature not lower than 50°C and not higher than a baking temperature of said resist film.

9. A method of producing a reflection type mask blank as claimed in claim 8, wherein said resist film is a chemically amplified resist.

10. A method of producing a reflection type mask blank as claimed in claim 8, wherein the heat treatment is carried out by keeping said multilayer reflection film formed on said substrate in contact with a liquid held in a heated state.

11. A method of producing a reflection type mask, comprising the step of forming a pattern on said absorber layer of the reflection type mask blank produced by the method of producing a reflection type mask blank claimed in claim 8.

12. A method of producing a semiconductor device, comprising the step of forming a fine pattern on a semiconductor substrate by lithography using said reflection type mask produced by the method of producing a reflection type mask claimed in claim 11.